NavMed P-369

UNITED STATES NAVY

MEDICAL NEWS LETTER

Vol. 39 Friday, 5 January 1962 No. 1

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Policy

The U. S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

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The issuance of this publication approved by the Secretary of the Navy on 28 June 1961.

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—Editor

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FROSTBITE: EXPERIENCE WITH RAPID REWARMING AND ULTRASONIC THERAPY (concluded)

William J. Mills Jr, Robert Whaley, and Winthrop Fish, Anchorage, Alaska. ALASKA MEDICINE, Part III, * Vol. 3, No. 2, June 1961.

From this study it is apparent that there exists no therapy which is more traumatic in cold injury than debridement. Mechanical rupture of the blebs converts the sterile field into a contaminated, potentially infected area. Incision of edematous and friable tissue permits ready access for bacteria, usually already present on the skin. From the gangrenous eschar, dry and wet, the authors have cultured in almost all their patients, staphylococcus aureus-coagulase positive. The organism is provided fertile culture media in these necrotic tissues. Too, incisions in these tissues, if carried too deep, will break through granulating epithelizing tissue below and may result in further suppuration. Further, debridement or amputation in the early stages (first to third week) will penetrate the edematous tissues which then retract. More bone and joint surface is thus exposed, with further tissue loss. If amputation

Premature debridement through wet, edematous tissues (52 days post injury) resulting in retraction of tissues.

Wet gangrenous change, thawed at room temperature (26 days post injury).

must be performed, it seems more proper to allow contracture and shrinkage of the tissues with formation of a stabilizing granulation bed below at the demarcation site prior to the surgical procedure.

There may exist one area where debridement is beneficial if carefully performed. When the dry eschar in the resolving injury retracts and tightens, tissue necrosis below or intrinsic muscle atrophy may develop. a fusiform

digit or even loss of much of the digit may follow. If the eschar prohibits distal or proximal interphalangeal joint motion, a linear volar or dorsal slit, even a bilateral digital slit, may permit increased motion. This will provide, by increasing the range of motion, early shedding of the eschar, especially during whirlpool therapy.

Care in making these incisions must be utilized because of the underlying thin layer of new granulation tissue that is so easily penetrated and injured.

Debridement is adequately and physiologically performed by the whirlpool itself. The bath's gentle motion removes eschar as it is released from the epithelizing bed only when it is physiologically prepared to separate.

Infection

Superficial infection was present in most of the writers' cases. Many cases demonstrated pockets of purulent material in the eschar. The superficial infection appeared held in abeyance by whirlpool, while increasing in many instances after debridement and without whirlpool.

For the first 4 years patients were placed routinely on broad spectrum antibiotics. In the past year antibiotics were utilized only after definite indication, and following culture and sensitivity studies. Their use was not essential in most patients utilizing whirlpool bath, but was more often required in patients otherwise treated.

Infection was found more often in those treated with occlusive dressings, not receiving whirlpool bath or daily lavage. It is presumed that the effectiveness of Hexachlorophene(R) in the bath was that of a germicidal agent permitting constant topical application, and was effective as prescribed because of its known property of reducing numbers of bacteria and interference with metabolism of pathogens as well as nonpathogens. It was used, too, as a prophylactic agent to decrease the incidence and severity of pyogenic skin infection. In the authors' experience, only constant whirlpool followed by dry "open" technic prevents the rapid growth of bacteria, particularly from the pockets of bacteria discovered on the gangrenous skin surface or the subcutaneous pools beneath the eschar.

The early appearance of the deep frozen extremity, once blebs have dried, is often that of a black mummified part extending even above the digits and involving all of the extremity's surface. The over-all appearance is often misleading. Amputation or debriding procedures at this period (6 to 21 days) may reveal viable deep structures that would have permitted epithelization under the eschar. Avoidance of premature amputation is essential. The eschar, after epithelization, will often loosen and shed permitting exposure of healing tissues below. If amputation must be performed at the digital level, most satisfactory results appear to be at the 60 to 90-day period. The digits will, as all have seen, demarcate spontaneously, requiring only revision later. It is usually sufficient to remove the necrotic bone back to bleeding cortex or medullary canal and permit the skin flap to fall over bone, utilizing then a

small vaseline pack for 3 or 4 days. This may be held in place with one loose wire suture. Within 7 days, or even less, granulation has usually occurred that will permit further whirlpool therapy.

Automatic debridement effect of whirlpool bath, with physiological separation of tissues; and *Exercise prognosis, against sterile fluffs, 36 days post injury.*

If, because of ascending infection, amputation must be performed at a higher level, it is absolutely essential to perform a strict Guillotine procedure. After edema has subsided and an adequate granular bed developed, revision of the stump can follow. All amputations were performed at extreme distal levels to preserve as much tissue as possible. It is interesting to note that only one patient sustained amputation following rapid rewarming as described and that resulted in loss only of a large toe.

Associated Injury

The writers' experience with injury followed by secondary frostbite is similar to others. All cases of head, thoracic, abdominal, or extremity injury must receive proper care including restoration of general body heat and restoration of blood volume. Relief, if at all possible, must be provided the neurovascular deficit as early as it is recognized. The approach here is similar to that of an open fracture where consideration is given first to preservation of life and limb, then to function, and last of all to cosmetic result. Despite the glibness of this approach, the problem is not that simple. Much clinical investigation is required to further the treatment of fracture dislocation or soft tissue injury of the extremity with associated cold injury.

Excluding patients whose psychotic reaction caused them to sustain cold injury as a result of deliberate exposure or involuntary exposure unclothed, the authors are interested in the patient who becomes irrational or confused on the trail after freezing injury, and the bed patient who after 5 or

6 days demonstrated a severe emotional reaction, even developing hallucinations. Langdon (5), interested in this problem, has described this reaction as a response in some to "a situational reaction of adult life, usually in individuals not prepared for the eventuality of frostbite." This reaction has followed the traumatic occurrence, usually in a remote forbidding area, which is often associated with considerable danger and fear of failure of survival. In many, a hypomanic reaction has been evident. Few of these patients required psychiatric care of any prolonged nature.

They did require understanding, tolerance of their mood, patience, and constant attention and encouragement. It appeared helpful to discuss the changes that were occurring in their extremities. Those who thus became a part of the program (and they are an active participant) progressed more rapidly than others. One of the most reactive patients had considerable relief (and added much to the project) by using a recorder at frequent intervals at the bedside. Here he related, giving date and hour, changes in sensation and motion or reaction to therapy as these changes developed. He gave to the authors their best documented history of the occurrence of the injury, and discussed his reaction from initial onset through hospitalization to discharge. He was, upon release from the hospital, quite "expert" in cold injury, at least as it involved his own episode.

Since it is important that the program be carried on without technical breaks or premature ambulation, it has been found effective to have at least two physicians or a physician and nurse, in some accord, follow these patients. One demands strict adherence to principles of treatment, serves as a buffer to explain the need for this discipline. The other should offer sympathy if the treatment becomes too demanding and rigid. This problem becomes obvious when one considers the helplessness of the patient with freezing injury of both hands and both feet (eight of the series). For weeks and months he is unable to bathe, feed himself, grasp objects, or attend to any personal needs, including bowel or bladder function, without second party support. Patients of this type, as noted by Langdon, are essentially "quadriplegic" because of injury to all four extremities, and may have episodes of hypomanic behavior together with outright fear, frequent irritability, and occasional depression.

Enzyme Studies.

The authors have obtained standard enzyme determinations for the past 2 years. This portion of the project developed through an effort to demonstrate a pattern of vascular change in tissue trauma and repair during the period or rewarming and postrewarming. Also, they had originally proposed to seek a method utilizing alkaline phosphatase, lactic-dehydrogenase, serum glutamic oxalacetic transaminase, and aldolase, as well as other standard enzymes that would possibly provide a prognostic tool for early determination of definitive injury. This was primarily planned to provide the military field commander and medical personnel a tool for estimating disability in terms of availbility

for duty or priority for evacuation. Some of the enzyme findings are quite interesting, and at this early stage appear to demonstrate, even with the nonspecific enzymes, the following findings:

(1) There is a rapid rise and early fall in superficial injury or injury treated by rapid rewarming. These patients seldom have demonstrated any tissue loss.

(2) Deep injury, treated especially by ice or snow pack or slow thawing or rewarming at room temperatures, demonstrated a delay in enzyme rise and a late fall that usually resulted in an anatomical pattern of marked tissue destruction.

(3) An interesting complication occurred in the plotting of enzyme levels when a combination of superficial injury of one extremity and deep injury of another in the same individual was present. Then an early and late peak were demonstrated in the enzyme curve.

(4) The authors found, too, that in control subjects with ultrasound, an early rise occurs that evidently demonstrates tissue breakdown from utilization of ultrasound. When patients with deep injury were rewarmed by methods other than rapid rewarming and had ultrasound as a part of their therapy, a dual peak occurred. Table 1 demonstrates a typical enzyme response in a patient who received rapid rewarming (No. 27), and Table 2 shows one thawed utilizing ice and snow (No. 20).

Radioisotope Studies

Accurate and repetitive determinations of blood flow in cold-injured extremities could be invaluable in assessing degree of injury, prognosis, and effects of therapy. Careful consideration of methodology suggested that radioisotope tracer technics might well meet the problems of changing tissue resiliency, asepsis, and noninterference with arterial circulation which practically exclude plethysmography, temperature measurement technic, or angiography.

Throughout the past year, pilot studies have been conducted to establish technic and to verify feasibility, utility, and safety. From studies on approximately 20 normal individuals, it seems apparent that adequate counting rates can be obtained over the hand, fingers, forefoot, and toes.

Radioiodinated (I^{131}) hippuran was administered intravenously. Dosage was 2 μc/kg body weight, total dose varying from 100 to 160 μc. The rate of appearance and the equilibrium level of radioactivity in the extremity were measured with a collimated scintillation detector coupled to a precision ratemeter and rectilinear recorder for readout. Only the equilibrium levels could be considered reproducible. Radiohippuran was rapidly excreted and in 24 hours only tracer amounts could be detected in the thyroid, thereby establishing the low biologic half-life of the compound.

It is apparent from the work of others that several times the dosage described can be used with safety. The introduction of I^{125} into clinical use will reduce expense and shielding problems. Therefore, it is concluded that semiquantitative measurement of circulation in the distal extremities and

POST FREEZING SERUM TRANSAMINASE

TABLE 1

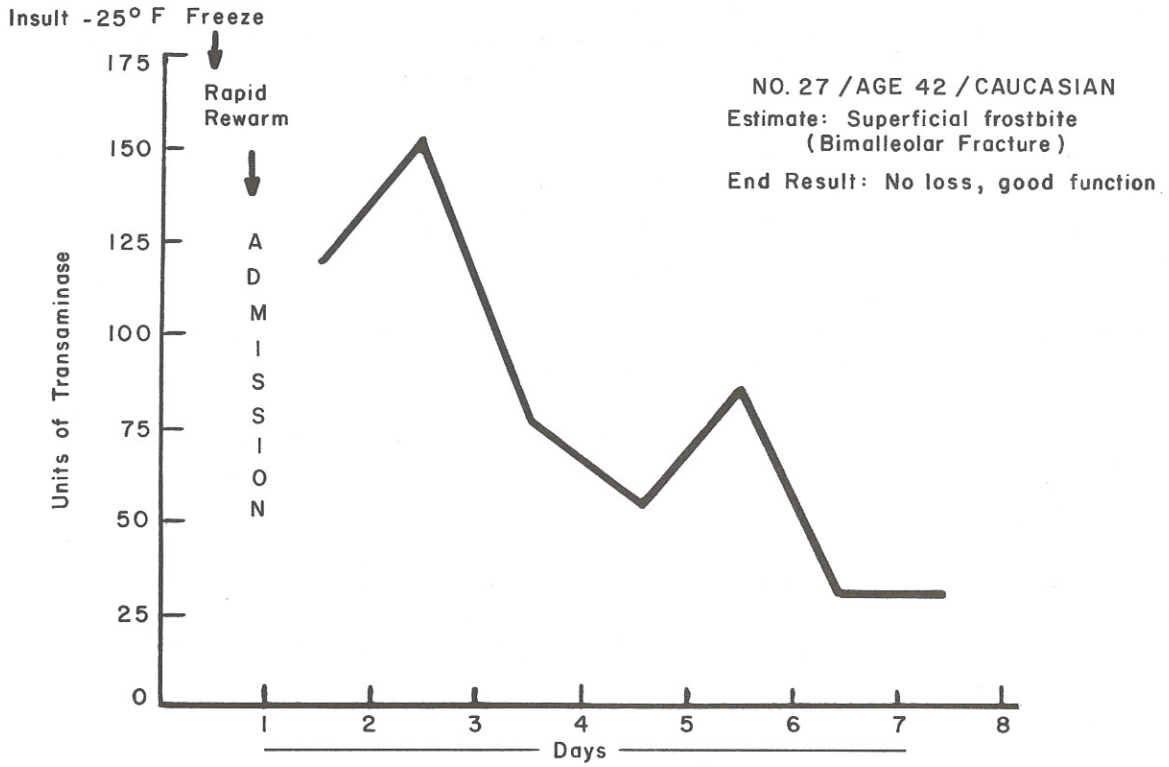
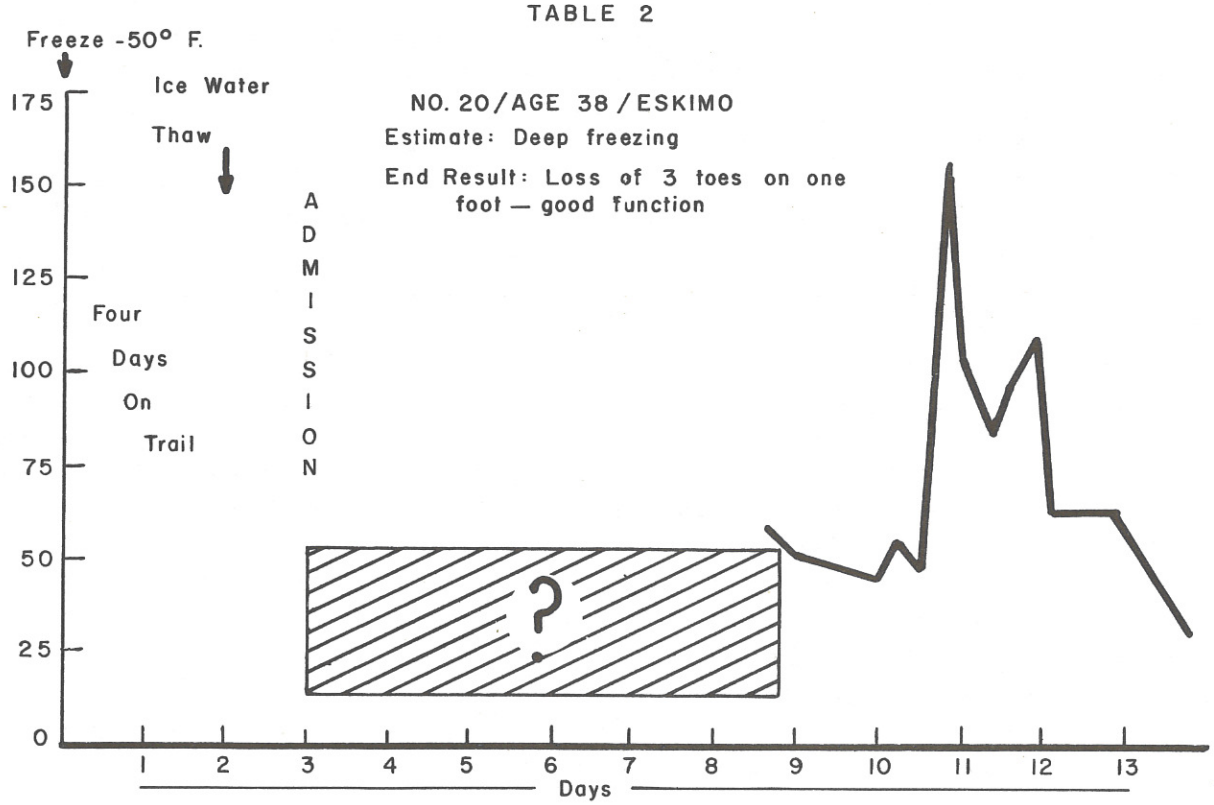


TABLE 2



digits can be made safely with the use of radiohippuran as described and that the method can be made applicable to the problem of cold injury.

Summary

Fifty-one cases of frostbite are presented, treated by varying methods and thawed by diverse means. In this small series the results of rapid rewarming in warm water by warm packs or by whirlpool bath at temperatures of 110 to 118 degrees Fahrenheit appear to demonstrate the most satisfactory results.

Regardless of method of thawing or rewarming, the results are more satisfactory with whirlpool therapy throughout the course of treatment than with any other treatment not using whirlpool bath and other physiotherapy. The addition of Hexachlorophene containing detergent (pHisoHex^{R}) to the whirlpool bath throughout the treatment period appears to prevent and/or control infection and to perform a physiologic atraumatic debridement. With whirlpool edema is lessened and odors eliminated or controlled, allowing functional exercises of the extremities.

Ultrasound as a form of deep tissue massage appears beneficial in cases of superficial injury, and at this moment in this small series appears not beneficial and probably harmful in deep injury.

The authors are greatly interested in the results of enzyme studies cursorily reported in Part III. These appear to provide an early estimate of depth of injury and tissue changes and some inkling of the ultimate prognosis even long before the gangrenous changes occur. It would also appear that Radioiodinated (I^{131}) hippuran scintiscanning of hands, fingers, feet, and toes can be of real service in determining the state of arterial circulation, degree of injury, effects of therapy, and the prognosis.

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* Parts II and III of these studies were aided by Contract Nonr 3183 (00) (NR 105-249) between the Office of Naval Research, Department of the Navy, and William J. Mills Jr, M.D.—Editor

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High Altitude Pulmonary Edema

H. N. Hultgren, W. B. Spickard, Kurt Hellriegel, and C. S. Houston. * Medicine 40:289-313, September 1961.

More and more people of all ages are visiting high altitude areas in many parts of the world due to improved methods of transport. People are traveling back and forth between seacoast and mountains many times a year. High altitude mountain climbing has never been so widely engaged in as during the past 10 years, during which all of the twelve highest, and previously unclimbed, peaks in the world were conquered. The condition described as high altitude pulmonary edema will, in all probability, be seen more and more often and its recognition and management—not to mention prevention—become important to many individuals. Mountaineers especially should be aware of the possibility that this serious condition may occur in members of their climbing parties in remote areas where prompt medical attention may not be available.

Susceptible subjects include those who have experienced previous attacks and, possibly, all acclimatized persons returning to the mountains after a stay at a lower elevation.

Adequate time should be taken in gradual ascent to permit full acclimatization, particularly by the susceptible individual. After arrival at a high altitude area, a brief period of rest and inactivity should be observed. Cough, undue dyspnea, orthopnea, pulmonary rales, or hemoptysis are indications for prompt medical attention.

Treatment should consist of rapid removal to a lower elevation if transport facilities are available since prompt hospitalization with absolute bed rest and the administration of continuous oxygen by tent or mask are indicated. If removal to hospital facilities is not feasible, oxygen must be given at the camp. In view of the uncertainty of the role of infection in the process, antibiotics should be administered.

The value of venesection, bloodless venesection by extremity tourniquets, morphine, digitalis, and diuretics is not clear at present, but in the urgency of this condition, it seems desirable to use those measures which are known to be of value in left ventricular failure from other causes.

All parties climbing above 15,000 or 16,000 feet should have available emergency oxygen sufficient to provide a minimum of four liters per minute for several days, and appropriate tools and spare parts should be provided to utilize additional oxygen if dropped by plane.

Eighteen patients with acute pulmonary edema which occurred upon exposure to an altitude of 12,200 to 15,300 feet were observed at the Chulec General Hospital in La Oroya, Peru from 1950 to 1959. Symptoms consisted of cough, hemoptysis, dyspnea, and weakness. Physical examination revealed tachycardia, cyanosis, and pulmonary rales. Signs of infection were absent. Roentgenograms revealed bilateral pulmonary densities which were patchy in 12 cases, diffuse in 6. Central pulmonary vessels were prominent. Cardiac enlargement was not observed. Bed rest and oxygen administration

resulted in complete clinical recovery and clearing of the pulmonary exudate in 24 to 48 hours. Fifteen of the 18 patients had been thoroughly acclimatized and developed pulmonary edema upon returning to the mountains after a one- to three-week stay at sea level. Three patients had not been exposed previously to high altitude.

Although the most likely cause of the edema is acute left ventricular failure, X-ray studies revealed no evidence of left ventricular or left atrial enlargement. Pulmonary venous constriction, a shift of blood volume to the lungs, and a residual elevation of plasma volume from prior acclimatization are additional causative factors requiring investigation.

Thirteen episodes of a similar syndrome occurring in mountaineers are described. Although such episodes have been previously considered to be instances of pneumonia, their similarity to the cases observed in Peru suggests that they also represent instances of high altitude pulmonary edema.

High altitude pulmonary edema appears to represent a unique effect of anoxia upon the circulation in man and deserves further study.

(The authors particularly thank the many interested individuals who so kindly supplied data regarding the occurrence of acute pulmonary edema in mountaineers. Dr. Herbert L. Abrams, Associate Professor of Radiology, Stanford University, reviewed the X-ray films.)

* Herbert N. Hultgren MD, Associate Professor of Medicine, Stanford University School of Medicine, Palo Alto, Calif.
Warren B. Spickard MD, Clinical Associate Professor of Medicine, University of Washington School of Medicine, Seattle, Wash.
Kurt Hellriegel MD, Chief, Medical Division, Cerro de Pasco Corporation, Chulec General Hospital, La Oroya, Peru.
Charles S. Houston MD, Internist, Aspen Clinic, Aspen, Colo.

(This study was supported by grants from the U.S. Public Health Service - H. 2583 - and the Sonoma County Heart Association.)

* * * * * *

The Solitary Dense Vertebral Body

John M. Dennis MD. Radiology 77:618-621, October 1961.

Osteosclerosis or increased density of the spongiosa of the vertebral bodies is observed in various diseases. The sclerosis may sometimes be diffuse and give the impression of an "ivory vertebra" as the spongiosa is replaced by an amorphous homogeneous bony mass. In other cases, the spongiosa is atrophic with only increased prominence of the trabeculae, or it is replaced by dense spotty irregular masses of bone. While osteosclerosis is frequently observed in several lower dorsal or lumbar vertebral bodies, its limitation to a single vertebral body is a rather unusual finding.

During the past several years in the Department of Radiology of the University Hospital (University of Maryland) an interest has developed in the solitary dense vertebral body and, to date, 16 cases have been collected. Eight of these were due to focal Paget's disease, 6 to lymphomatous involvement, and 2 to metastatic cancer. Of the 6 cases secondary to lymphomatous involvement, 5 were microscopically diagnosed as Hodgkin's disease and the other as reticulum-cell sarcoma. Solitary dense vertebral bodies have also been ascribed to Kümmel-Verneuil vertebral disease, sprue, and pachyderma, but the author has encountered no such cases.

In the differential diagnosis of solitary dense vertebral body, three diseases should usually be considered: (a) Paget's disease, (b) lymphoma, and (c) metastatic cancer. Roentgenologically, involvement of a single vertebral body by Paget's disease is typical of that elsewhere in the osseous system. Lymphomatous involvement produces a diffuse homogeneous sclerosis of the involved body in contrast to the prominent trabeculations, increased size, and double contour of the vertebral body in Paget's disease, and the patchy osteosclerotic involvement in metastatic cancer. The presence of osteoblastic activity extrinsic to a dense vertebral body is quite characteristic of lymphoma.

(From the Department of Radiology, University Hospital, University of Maryland School of Medicine, Baltimore, Md.)

(Editor's Note: Interested readers are encouraged to refer to the original of this excellent article and to the clear roentgenograms depicting the conditions described.)

* * * * * *

Serologic Investigation of Leptospiral Infections in Dairy Farmers and Cattle Ranchers

Norman G. Miller. Amer J Hyg 74: 203-208, September 1961. *

Various occupational groups are in frequent contact with animals harboring leptospires. In view of the increased incidence of bovine leptospirosis during the last decade in the United States, a higher rate of leptospiral infections may be anticipated in people whose occupation brings them in close contact with these animals. Farmers maintaining cattle for the purpose of milk or meat production may be considered a potential occupational group subject to infection with leptospires. Cases of leptospirosis attributed to direct or indirect contact with cattle have been reported periodically in farmers. Galton el al state that the probable source of infection in 25 of the 64 human cases of leptospirosis reported to the Communicable Disease Center, PHS DHEW, during a 3-year period was "contact with infected cattle or swine in abattoirs or on farms."

Also of importance to the epidemiologic picture of leptospirosis in occupational groups associated with cattle is the variety of leptospiral serotypes

which may infect these animals. Some 9 serotypes have been demonstrated in cattle in this country either by isolation or serologic technics.

In view of the prevalence of leptospirosis in cattle, the reports of human cases as a result of contact with these animals, and the variety of serotypes associated with them, it was thought to be of interest to gain additional information by means of serologic methods concerning the incidence of infection as well as the serotypes involved in both dairy farmers and cattle ranchers primarily within the State of Nebraska.

Methods and Materials

Serum Samples. The 322 serum samples examined in this survey for leptospiral antibodies were taken from adults representing both sexes who were associated with dairy farms or cattle ranches and stated that they came into direct contact with cattle. Those individuals designated as dairy farmers kept cows primarily for the production of milk, whereas those designated as cattle ranchers raised cattle as a source of beef. One group of 34 people in the southeast area worked in a packing house and are considered separately.

All persons included in this study live in 4 distinct geographic locations with respect to the State of Nebraska. The southeast area includes 103 people living in the general vicinity of Fairbury, Neb. A few persons are included who live in nearby towns in the State of Kansas. A total of 91 persons living within a 50-mile radius from Basset, Neb., are included in the northcentral area. The northwest area is made up of a relatively small number of 30 people from cattle ranches located within a 40-mile radius from Chadron, Neb., and includes a few ranches in South Dakota. The eastcentral area comprises a group of 99 persons living on farms within a 40-mile radius of Omaha, Neb.

A serologic investigation of 288 dairy farmers and cattle ranchers for leptospiral infections revealed an incidence of 2.9% in the two occupational groups. Separately, the dairy farmers experienced a higher rate of infection (3.8%) than the cattle ranchers (2.6%). Neither of these two groups appears to have as high a rate of leptospiral infectivity as the packing house worker.

Four serotypes, Leptospira pomona, L. grippotyphosa, L. sejroe, and L. icterohemorrhagiae were detected in 3 of the 4 geographic areas studied. These are located primarily in Nebraska. The most common serotype, L. pomona, was found exclusively in the southeast area which experienced an epizootic in cattle in 1958. In the northcentral area, 3 farmers and a cattle rancher had agglutinins for L. grippotyphosa suggesting the possibility of an enzootic in cattle in this area. Agglutinins for L. sejroe were demonstrated in a dairy farmer in the east central area. This is believed to be the first indication of human infection by a member of the hebdomadis group in the United States.

* (From the Department of Medical Microbiology, College of Medicine, University of Nebraska, Omaha, Neb.)

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MISCELLANY

SPECIAL NOTICE TO AVIATION PERSONNEL WHO ENGAGE IN SCUBA DIVING

The School of Aviation Medicine at Pensacola has recently completed an evaluation of scuba diving hazards to flying personnel. A formal directive will be published in the near future on this subject. In the interim, wide dissemination should be given to the following safety rule.

> All personnel who have engaged, either on a recreational or line of duty basis, in SCUBA, or any other type of diving utilizing underwater breathing apparatus of any type to depths in excess of 30 feet (or who have been exposed to equivalent pressures in excess of this depth in a recompression chamber) should not fly to cabin altitudes in excess of 18,000 feet (or make decompression chamber ascents above this altitude equivalent) within 12 hours following the termination of such a dive or recompression chamber descent. (AvMedDiv, BuMed)

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American Board of Obstetrics and Gynecology

Office of the Secretary

Robert L. Faulkner MD
2105 Adelbert Road
Cleveland 6, Ohio

The next scheduled examinations (Part II), oral and clinical, for all candidates will be conducted at the Edgewater Beach Hotel, Chicago, Ill., by the entire Board from 9 April through 14 April 1962. Formal notice of the exact time of each candidate's examination will be sent him in advance of the examination dates.

Candidates participating in the Part I Examination will be notified of their eligibility for the Part II Examinations as soon as possible.

Current Bulletins of the American Board of Obstetrics and Gynecology outlining the requirements for application may be obtained by writing to the Secretary.
(Training Branch, Professional Division, BuMed)

* * * * * *

Attention All Aviation Examining Personnel!

The Bureau of Medicine and Surgery has had two cases during the past 30 days, one officer and one civilian applicant, who were wearing contact lenses which were not detected during the eye examination.

The case of the officer came to light after he had completed a month's training course. It was discovered that he had been wearing contact lenses and that his uncorrected visual acuity was 20/400 both eyes.

The case of the applicant came to light through his ROTC record which indicated visual acuity of 16/400 both eyes. When faced with the fact that his ruse had been discovered, the applicant readily admitted wearing contact lenses. His uncorrected visual acuity is 20/200 both eyes.

How Can This Happen? In the case of the officer, he did not receive a refraction, so he went undetected without any great difficulty. However, the case of the applicant was somewhat different. He was refracted and examined both without detection of the contact lenses. This young man simply removed his contact lenses when he saw drops being administered to other applicants. When the administration of the drops was completed, he quickly replaced the lenses and was refracted without the lenses being detected.

This article is published for the information and guidance of all aviation examining personnel, and with a strong word of caution to be extremely careful of all examinees so that this does not happen to you. (AvMedDiv, BuMed)

* * * * * *

Limits of Thermal Comfort in the MK-5 Anti-Exposure Suit

Roland A. Bosee CAPT MSC USN, Director, Air Crew Equipment Laboratory, Naval Air Material Center, Philadelphia, Pennsylvania.

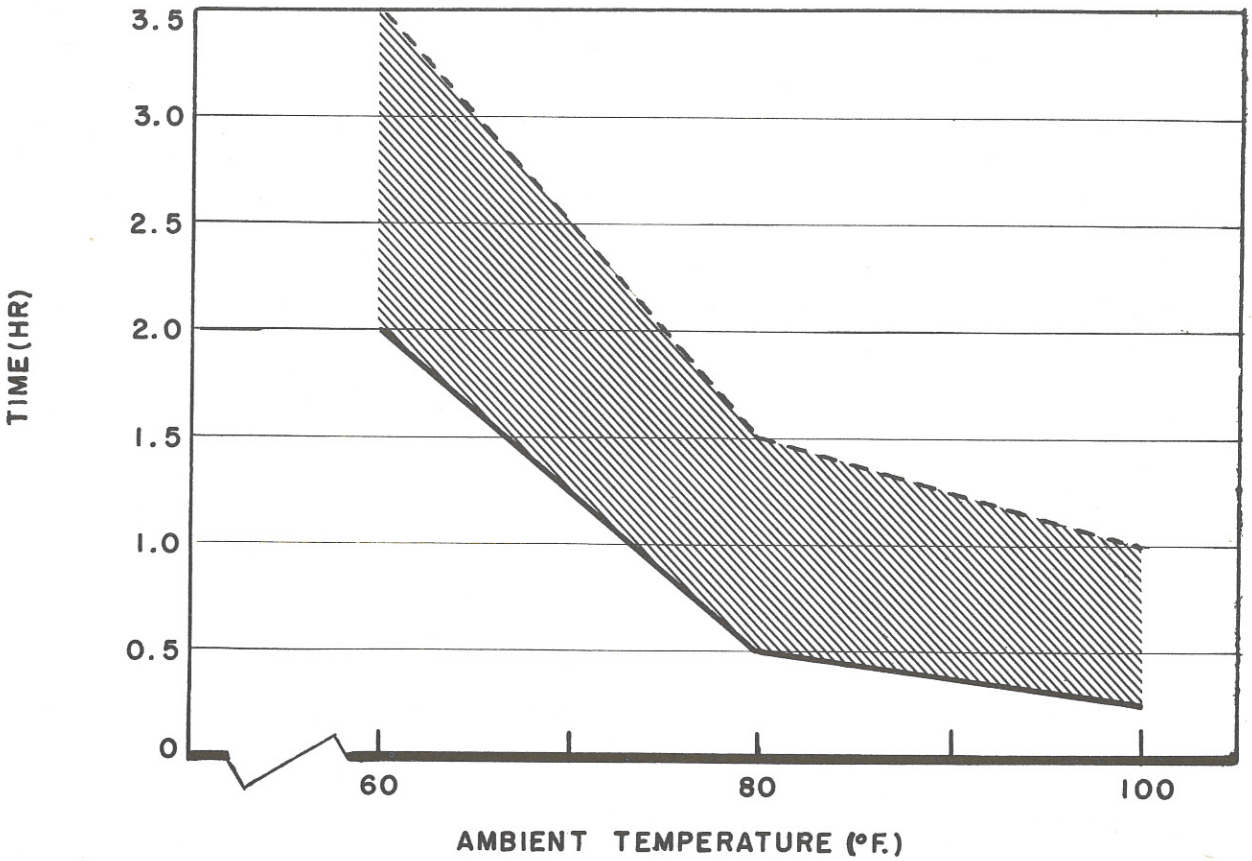
The USN MK-5 anti-exposure suit is designed to protect aircrew personnel under environmental conditions of extreme cold and heat. The low temperature environment may be in terms of dry cold exposure or water immersion. The high temperature conditions are encountered in pre-flight periods or in the cockpit itself. Within the cockpit environment, ventilating air is available to the crewman so that body cooling might be effected through evaporation. In the event that a source of ventilating air is not available or not operating, the question arises concerning the limits of thermal comfort expressed in terms of exposure time at various ambient temperatures (Ta).

While this area of MK-5 research has not been extensively investigated in the Air Crew Equipment Laboratory, Philadelphia, certain guidelines in regard to tolerance limits in the unventilated state have been delineated in the course of experimentation with the exposure suit. Sitting-resting subjects clothed in the protective suit and instrumented with body temperature sensors

were exposed to environments of three temperature levels for 2-hour test periods. The evaluation of the subject response was based on weighted mean skin temperature changes, total water loss, and subjective comfort.

The solid line of the following graph indicates that a state of comfort is maintained for 2 hours at Ta 60°F, for 0.5 hours at Ta 80°F, and 0.25 hours at Ta 100°F. In order to extend these points through the range of a comfortably

TOLERANCE LIMITS OF THERMAL COMFORT ZONES WEARING THE MK5 EXPOSURE SUIT AT VARIOUS AMBIENT TEMPERATURES



warm condition, the broken line of the graph indicates the extension of a comfortable zone to a comfortably warm condition at the indicated ambient temperatures. Thus, a comfortably warm state is engendered at 60°F Ta through a test period of 3.5 hours, at 80°F Ta through 1.5 hours, and at 100°F Ta through 1.0 hour. It is considered that exposure times beyond the shaded area of the graph would effect an intolerably warm state in aircrew personnel. It is to be noted that the results are based on minimally active subjects and that any appreciable increase in activity above this resting level would greatly reduce the exposure period at the indicated ambient temperatures in the maintenance of thermal comfort levels.

The possibility of wide interpretation is inherent in the determination of thermal comfort zones which are based on subjective evaluation alone. This is especially observable in experimental environments of 60°F and 80°F. At the highest ambient employed in zero-ventilation studies, i.e., 100°F, however, objective measurements of body temperature and total weight loss are most definitive in delimiting the points indicated on the graph.

* * * * * *

Public Health Service Observes Pearl Harbor Day

Surgeon General Luther L. Terry announced that the Public Health Service held open house at twenty-two Civil Defense Medical Stockpile Depots in fourteen States on December 7, the 20th anniversary of Pearl Harbor Day.

The general public was invited to inspect the installations and learn what drugs, medical supplies, and equipment are available for use in a national emergency.

Locations of the depots which held open house are: California - Mira Loma and San Jose; Illinois - Carterville and Seneca; Indiana - Jeffersonville; Iowa - Hampton; Massachusetts - Gilbertville; Michigan - Marshall; Mississippi - Prairie; Missouri - Neosha and Springfield; New York, Horseheads and Romulus; Ohio - Marion and Shelby; Pennsylvania - Lebanon, Montoursville and Shamokin; Tennessee - Rockwood; Texas - Bastrop; Washington - Spokane and Yakima.

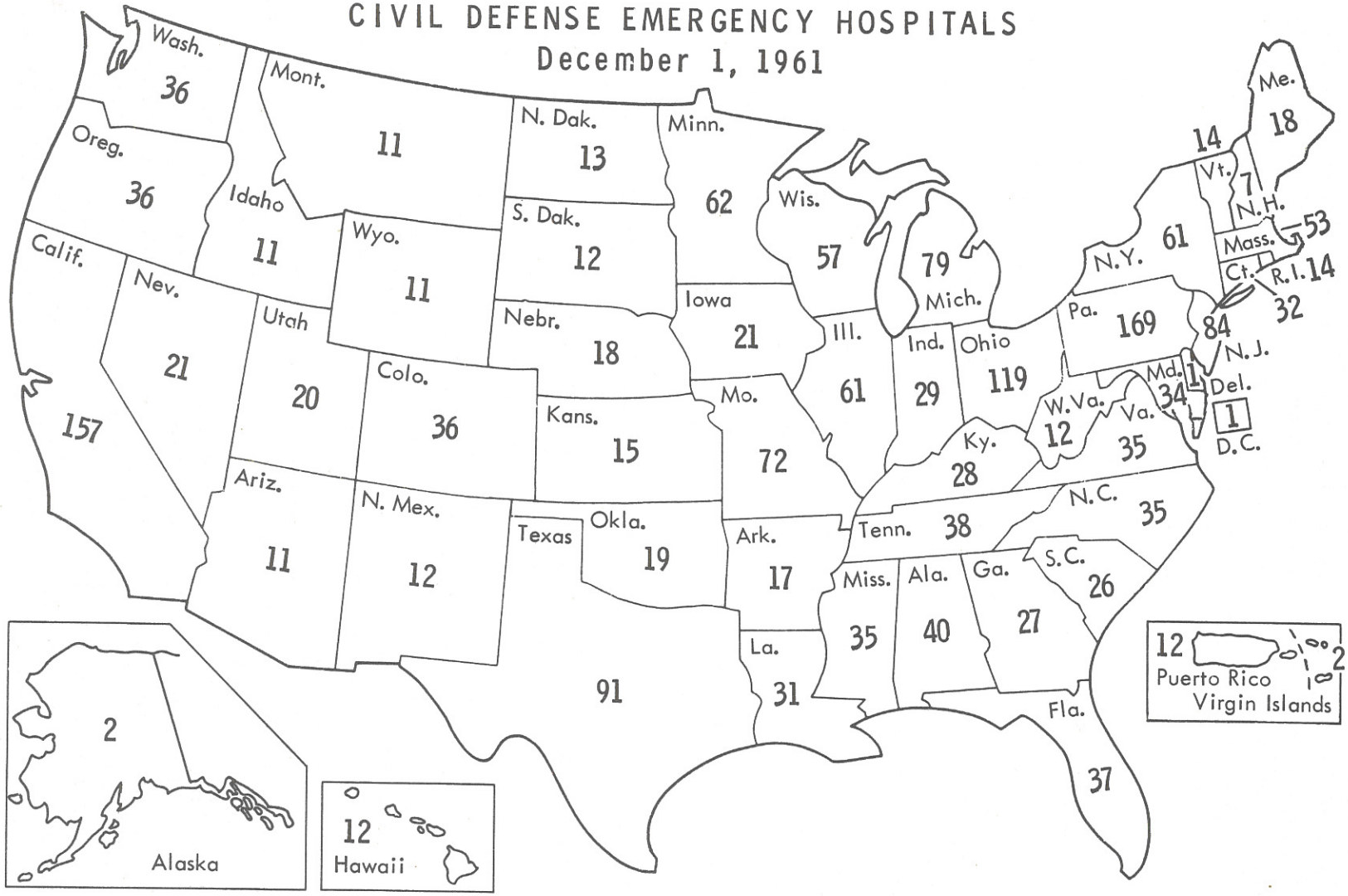
The largest single item in the 260 million dollar National Emergency Medical Stockpile inventory is the Civil Defense Emergency Hospital (CDEH). This is a functional, 200-bed general hospital stored in boxes which can be set up quickly in an existing structure, such as a school, church building, or community center, to serve independently or in conjunction with a regular hospital.

"As of July 1, 1961" Dr. Terry explained, "the Federal Government had purchased 1930 CDEHs at a cost ranging from $21,000 to $26,000 each. The majority are positioned in carefully selected, dispersed, strategic locations throughout the United States. They can be expected to replace a significant portion of the regular hospitals which could be destroyed or made unusable by a mass attack upon this country."

Management of the Civil Defense Emergency Medical Stockpile is part of the Public Health Service responsibility for various medical and health functions in both natural and manmade disasters. The total emergency preparedness program is being coordinated by the Division of Health Mobilization, Office of the Surgeon General, and is directed to six major areas of assistance to States and local communities: planning and evaluation, medical stockpile management, health resources, program services, research, and training.

Included is the new Medical Self-Help Training Program to teach families how to survive a national emergency and how to meet their own health needs if deprived of a physician's services. A chart showing locations of Civil Defense Emergency Hospitals follows.

CIVIL DEFENSE EMERGENCY HOSPITALS
December 1, 1961



Civil Defense Emergency Hospitals (CDEH's) are part of the Civil Defense Emergency Medical Stockpile managed by the U. S. Public Health Service. CDEH's are 200-bed general hospitals, equipped and prepositioned in communities to place a life-saving facility in the hands of physicians and allied medical personnel in a national emergency. CDEH's designed for training are available from States to permit responsible personnel to obtain practice in the setting up and operation of the hospital.
(Note: The above listing totals 1,907 of the 1,930 hospitals. The balance will be prepositioned shortly.)

From the Note Book

Intensive Course in Psychiatry for Medical Officers. A four-month intensive course in psychiatry will be offered for a limited number of Medical officers at the U.S. Naval Hospital, National Naval Medical Center, Bethesda, Md., starting 30 July 1962 and finishing 30 November 1962. The course will include didactic and practical instruction in basic clinical psychiatry, psychotherapy, psychiatric diagnosis, interview techniques, and principles of psychotherapy. Instruction will be provided by hospital staff members and selected civilian specialists. Each Medical officer who successfully completes this course will be assigned for at least the following 19 to 20 months to a psychiatric billet in a naval facility under an experienced psychiatrist. Applicants must, therefore, have at least approximately 24 months of obligated service at the start of the course. There is no additional obligated time for the course of instruction. Interested applicants should submit requests to the Chief, Bureau of Medicine and Surgery no later than 15 February 1962.

It is suggested that the letter of application include any information concerning particular interest, experience, or training in the general field of psychiatry, neurology, or the basic sciences related thereto, such as summer clerkships, research in the field, or assignments in mental hygiene clinics or psychiatric hospitals. Such experience is not mandatory but would be helpful in evaluation of the applicants. (NP Branch, Professional Division, BuMed)

Award to Mrs. Kirby N. Gunn. The Bureau of Medicine and Surgery has adopted a beneficial suggestion by Mrs. Kirby N. Gunn, a civilian employee of the U.S. Naval Hospital, Corpus Christi, Texas. As a result of the Bureau's consideration of her suggestion, BUMED INSTRUCTION 6230.34 of 18 October 1961 was prepared and released by the Bureau to all naval hospitals, activities having station hospitals, and naval dispensaries. This INSTRUCTION prescribes the securing of an identification band to the left wrist of all inpatients at the time of admission unless medically impractical, in which case it shall be placed on the right wrist, left ankle, or right ankle, in that order. Identification items on the insert card of the band shall include the patient's full name, register number, and date of admission. Identification bands are available in the Federal Supply Catalog.

Mrs. Gunn will receive a $150.00 cash award in recognition of the benefits resulting from the Bureau's adoption of her suggestion, in addition to the $75.00 she received initially for use of her suggestion at the U.S. Naval Hospital at Corpus Christi. The appreciation of the Bureau has been expressed to Mrs. Gunn via the Commanding Officer of USNH Corpus Christi for her interest in submitting a suggestion which will result in increased efficiency throughout Medical Department activities.

The importance of proper identification for patients receiving surgery, blood replacement, therapy, medication, and diagnostic examination is evident and cannot be overemphasized. —From Chairman, BuMed Incentives Award Committee, 7 December 1961.

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DENTAL SECTION

Should the Teeth Be Scaled Prior to Surgery?

Robert Gottsegen, AB, DDS, 37 Park Avenue, New York 16, N. Y.
J Periodont 32:301-307, October 1961.

A survey of the literature reveals that the reasons offered for preparatory subgingival scaling have been (1) reduction of inflammation with less hemorrhage at time of operation, (2) reduced likelihood of excess granulation tissue in healing, (3) less chance of infection, (4) quicker healing, (5) elimination of the need for surgery. To these most frequently repeated reasons have been added (6) if the gingiva is made fibrous and firm by reduction of inflammatory edema first, it can be carved to a predictable desired form at gingivoplasty—Goldman, and (7) the period of scaling is a trial period during which time the patient demonstrates his willingness and ability to carry on proper oral hygiene, since periodontal surgery is reserved only for those who can, and will, co-operate to the utmost—by Ramfjord.

In spite of traditional repetition and acceptance, most of these reasons turn out to be opinions unsupported by evidence. Let us now consider the alleged benefits of preliminary scaling one by one.

Reason number 1: Glickman has stated, "No purpose is served by 'half-scaling' a tooth and waiting for the gingiva to 'half-heal,' while permitting some of the very irritant responsible for the gingival inflammation to remain on the root surface." Glickman's point seems to be that incomplete scaling does no good.

How often have we had the experience of vigorously scaling an area, seeing the inflammation materially subside and then, at surgery, finding one or several plaques or flakes of calculus still firmly attached to the now exposed and visible root surfaces. Even though the prior scaling was incomplete and the inflammatory involvement of the gingiva did not completely disappear, there was enough of a change to reduce the amount of hemorrhage and, consequently, to make it easier to visualize the residual calculus.

Reason number 2: Less granulation tissue forms in healing. In our experience, the problem of excess granulation has only been an infrequent one and one cannot but wonder if this might be due in part to the standards of scaling which were set up for us by such men as Isadore Hirschfeld.

When over-granulation does occur there seem to be two major causes. One is movement of the surgical pack over the healing surface and the other

is incomplete calculus removal at the time of surgery. Since both the ease of hemostasis and the ease of calculus removal are influenced strongly by the amount of operative hemorrhage, we have another strong reason for reduction of inflammation by adequate prior scaling.

Reason number 3: There is less chance of infection. It has been stated that prior scaling reduces the number of bacteria and foreign bodies in the field. This may be significant. A study should be made as to whether there is any difference in the transient bacteremia caused by periodontal surgery in prepared versus unprepared areas, or whether the presence or absence of a suppurative exudate makes any difference. Of course, it could be argued that even though there may be less bacteremia when surgery is done on non-inflamed tissue around clean smooth roots, several episodes of transient bacteremia were caused by the scaling sessions necessary to make them that way.

Reason number 4: A traditionally held reason for pre-gingivectomy scaling is that healing is more rapid when it is done. I am not aware of any investigations supporting this for all types of periodontal surgery. Goldman has written: "It has been noted that incision into a clinically soft, edematous, friable tissue results in poor healing. Granulation tabs result and complete epithelization of the wound is sometimes long delayed." This seems to apply more to purely gingival surgery than to muco-gingival or to mucosal. There is no experimental evidence on this problem, but experience suggests that mucosal surgery heals just as rapidly and just as well even when the adjoining gingiva is inflamed if it is removed during the operation.

Reason number 5: There is an occasional disappearance of the need for surgery. There is no doubt that many cases respond to meticulous subgingival scaling and root planing alone, and we can predict these cases with greater accuracy now as our knowledge of and experience with both the possibilities and limitations of this technic grow.

Reason number 6: The gingiva can be carved to a predictable form when it has been rendered firm and fibrous rather than edematous and friable. We can agree with this further argument of Goldman's if the surgery is to be within the attached gingival zone strictly, as in the gingivoplasty.

Reason number 7: Ramfjord contends that the period of scaling is a trial period during which the patient documents his interest and ability in oral hygiene. Most patients in a private periodontal practice have demonstrated their willingness to cooperate by seeking out and subscribing to treatment in the first place. They will generally do their part if for no other reason than to protect their investment in the time, discomfort and expense of treatment. However, there are some patients who feel that their own responsibility has ended once they have entered into treatment. "The periodontist is being paid; let him do the work" is what they are saying. It is wise to recognize and correct this type of patient early in the course of treatment.

What conclusions can be reached? In agreement with Ramfjord it may be stated in general that while "scaling prior to periodontal surgery is not 'necessary'.....(it) is rational, beneficial, safe, sensible and practical."

To this statement should be added:

1. Pre-surgical scaling, even when incomplete, results in less hemorrhage at the time of operation with its attendant advantages.

2. Pre-surgical scaling reduces the time required at operation, and therefore, the trauma of operation.

3. For purely gingival surgery, such as the gingivoplasty, preliminary complete scaling and root planing is almost essential to render the tissue firm and fibrous so it can be carved to a predictable form and also to achieve maximum shrinkage which may eliminate the need for surgery altogether.

4. For mucosal or muco-gingival surgery in which the attached gingiva is completely removed, prior scaling is less necessary, and in the absence of a potential bleeding problem may often be left incomplete.

Any investigation which purports to show the influence (or lack of influence) of pre-surgical subgingival scaling by comparing the behavior of a "scaled" segment to that of an unscaled segment has a built-in unknown which makes the evaluation of the experiment uncertain, that being the quality of the scaling.

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Pain Involving the Temporomandibular Articulation

Laszlo Schwartz, DDS, Clinical Professor of Dentistry, School of Dental and Oral Surgery, Columbia University; Director, Temporomandibular Joint Clinic, Columbia-Presbyterian Medical Center, New York, N. Y.
Dental Clinics, July 1959.

Pain involving the temporomandibular articulation arises most often in its musculature. This is true whether or not there is actual joint involvement.

The pain of the temporomandibular joint pain-dysfunction syndrome is usually described as a dull and constant unilateral earache or jawache, sometimes involving the head, neck, and shoulder. Limitation of mandibular movement is the most common type of dysfunction. There is usually an associated deviation of the mandible toward the symptomatic side during the opening, and sometimes during the protrusive movements. Lateral movement toward the opposite side is often limited and painful.

Though limitation is the most common type of dysfunction, subluxation may also be encountered. This is described as a momentary slipping, jumping, or locking of the mandible followed by dull facial pain and a feeling that the teeth no longer mesh properly. Spasm of the masticatory muscles is present with both limitation and subluxation. Palpation discloses painful areas in the muscles on the symptomatic side, sometimes with tenderness over the area of the temporomandibular joint.

Diagnostic Procedures. Main reliance is placed upon the history and physical examination: (1) Taking a complete history is important. (2) The physical examination occurs simultaneously with the taking of the history; the

appearance, posture, and character of bodily movements often tell much about the patient. These findings and procedures may also prove informative: facial appearance, mandibular movements, palpation of joints and muscles, auscultation, dental and oral examination, roentgenographic examination.

Treatment

The treatment of the temporomandibular joint pain-dysfunction syndrome is basically like that for other myofascial pain syndromes. There are, however, additional considerations because of the problems presented by the occlusion of the teeth and the special psychological reactions to mandibular dysfunction and facial pain:

Local Anesthetics. There are two means of administration: (1) ethyl chloride spray on the surface of the skin overlying the painful muscles; (2) infiltration of a local anesthetic directly into painful areas of muscles.

Therapeutic Exercises. The most useful exercise for the treatment of painful limitation is stretch. This can be applied in one of three forms:

1. Passive stretch (obtained by therapist only)
2. Active stretch (obtained by patient only)
3. Assistive stretch (obtained by both)

Relaxation. Since the temporomandibular joint pain-dysfunction syndrome is a tensional syndrome, it is obviously of first importance to relax the patient.

Considerations in Management. In the management of pain involving the temporomandibular articulation, it is wise to withhold treatment until a diagnostic impression, based on a complete history and thorough examination, has been reached. Testing the individual response to local anesthetics and exercise provides valuable information as to prognosis.

In treatment, it is important to consider the patient as a whole. Many patients are reassured simply by gaining an understanding of the psychologic and physiologic mechanisms that are operating. Though tensional habits such as gnashing and clenching play an important part, it is best to let the patient decide for himself to what extent he wishes to control such habits. An insistence on the part of the dentist that they cease at once may cause increased tension. It goes without saying that consideration of the psychologic aspects of the problem concerns itself with the problem per se and not with the patient's adjustment to life as a whole. Generally speaking, in treatment, the aim should be to relax the patient, relieve pain and lessen mandibular dysfunction. The dentist should curb any impulse he may have for dramatic action, particularly as far as the alteration of the occlusion of the teeth is concerned. A sound guide is the counsel of Hippocrates which states that we should try our best to help each patient but should avoid harming him.

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Slide Study Sets on Loan

The third in a series of slide lectures, "Diagnosis for Complete Dentures," prepared by the U.S. Naval Dental School, NNMC, Bethesda, Md., is now available for loan on a short-term basis. This study set consists of 81 colored 35 mm slides, a bound narration in lecture form, side file, hand viewer, and carrying case packaged to facilitate use by students, instructors, or professional groups.

Other slide lectures prepared by the Naval Dental School are (1) Mouth Preparations for Removable Partial Dentures, and (2) Remount Technique for Occlusal Correction of Complete Dentures. In addition, a pathology course entitled Non-Neoplastic Oral Lesions is available for individual home study. This course consists of 25 microscopic slides together with a booklet which gives the clinical history, microscopic description and diagnosis of each slide.

The loan of a study set should be requested by filling in the form below and sending it to: Commanding Officer (Code 7) U.S. Naval Dental School, National Naval Medical Center, Bethesda, Md.

From: _____
(name, rank, full address)

To: Commanding Officer, U. S. Naval Dental School (Code 7)
National Naval Medical Center
Bethesda 14, Maryland

Subj: Illustrated lecture; request for loan of

1. It is requested that I be granted the loan of the illustrated lecture _____ for approximately two weeks.

2. It is requested that the period of the loan commence on, or about _____ 196_, to expire not later than two weeks from date of receipt.

3. I will exercise due care in handling and stowing this training material and will return it in the original carton with the enclosed franked address labels attached at the expiration of the loan period.

_____
(Signature)

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Personnel and Professional Notes

CAPT Kyes Appears at Seminar. Capt Frank M. Kyes DC USN, Director of Dental Activities, 9th Naval District, spoke on the subject of Organization Planning and Practice during a two-week seminar for management analysts sponsored by and conducted at the Headquarters, 9th Naval District, Great Lakes, Ill., 16-27 October 1961. The speakers included personnel from the Navy Management Office, Civil Service Commission and General Services Administration in Washington, D.C., Sperry Rank, International Business Machines, Standard Register, and various mid-western military personnel.

CDR Kratochvil Participates in Meetings. Cdr Frank J. Kratochvil DC USN, Diplomate, American Board of Prosthodontics; Head, Partial Denture Branch, U.S. Naval Dental School, NNMC, Bethesda, Md., participated in the following Washington, D.C., area scientific meetings:

The Northern Virginia Dental Society: A paper, Removable Partial Denture Planning and Design.

The Southern Maryland Dental Society: A paper, Removable Partial Denture Treatment.

Georgetown University: A seminar, Proper Case Design When Using Periodontally Involved Teeth as Partial Denture Abutments.

CAPT Newman Presents Paper. Capt W.A. Newman DC USN, Head, Enlisted Training Department, U.S. Naval Dental School, NNMC, Bethesda, Md., participated in the New London County Dental Association meeting held recently in New London, Conn. He presented a paper entitled Removable Partial Dentures.

Dental Training Committee. The Dental Training Committee will meet in the Bureau of Medicine and Surgery in early March 1962 to consider applications from qualified Dental officers. Requests will be considered for assignment to the General Postgraduate Course; long courses in civilian schools in the dental specialties, basic sciences, or public health dentistry; and to residency training in ADA approved naval facilities. Interested Dental officers should submit their applications in accordance with Article 6-130, Manual of the Medical Department, to arrive in the Bureau not later than 16 February 1962.

CAPT Lepley Presents Lecture. Capt James B. Lepley DC USN, Diplomate, American Board of Prosthodontics and Head of the Prosthetic Department, Dental Service, U.S. Naval Hospital, San Diego, Calif., presented a lecture entitled Stress Distribution in Partial Denture Design before the Camp Pendleton (Calif.) Dental Group on 27 November 1961, at the Del Mar Commissioned Officers Mess (Open), Camp Pendleton.

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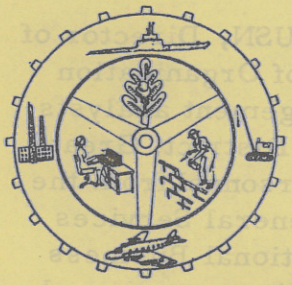

OCCUPATIONAL MEDICINE

The Multiple Reactor in Industrial Dermatology

Leon Goldman, Professor of Dermatology, College of Medicine, University of Cincinnati, Cincinnati, Ohio. Industrial Medicine and Surgery 30:447-449, October 1961.

In industrial dermatology the problem of the multiple reactor is important. Although this type of skin reaction has been known since the early days of skin testing, in recent times little attention has been paid to it, even by dermatologists, and insufficient investigative work has been undertaken.

It is the author's feeling that the broad definition of the multiple reactor is not well understood by physicians, including dermatologists, nor, unfortunately, by compensation boards and by insurance carriers. Today, it is believed that the multiple reactor is an individual who reacts not only to chemical stimuli but also widely to mechanical factors, physical agents (including all forms of radiation), and even to the social stimuli of his environment. In the past, the multiple reactor was termed "multivalent" or "polyvalent" and it was believed that he was an individual with a hypersensitive skin who reacted with eczematous responses to many different, diverse, and even unrelated materials. The fact that these materials whould be substances with which he had never come in contact, substances with which he had not been concerned at all in his job or home environment, was not well understood or recognized.

It is again important to emphasize the significance of the multiple reactor. Such a person acquiring an industrial dermatitis obviously has his affliction prolonged for a considerable period of time. This means great loss in earned income, increased demands on his insurance carrier, and even increased expenditures of government funds. Moreover, the problem of job placement for such a reactor is difficult.

Unfortunately, the incidence of such a reactor, in the broad sense of the term, is not known. It is assumed to be approximately 1 to 2%. It is not known whether or not the incidence of this reaction is increasing. As indicated previously, it was in the study of the syndrome of eczematous hand dermatitis that most of the writer's cases of the multiple reactor were found. In 146 cases of hand dermatitis studies, only 14 were found to be proved

contact eczematous dermatitis with the specific contactant identified. Five other cases had multiple positive patch reactions that varied from time to time with no correlation to job or home work. All these five cases had chronic dermatitis with acute flares and with frequent spread of disseminated lesions over the arms and often the face and neck. Change of job produced no lasting effect. Hospitalization gave only temporary improvement.

Clinically, this individual presents varying degrees of extensive dermatitis, eczematous, subacute, and more frequently lichenified types. Lesions may be distributed not only on the exposed areas of the hands and forearms, but also may be widespread even to an exfoliative dermatitis. As indicated, there is often a history of recurrent episodes, apparently unrelated to his work, to his home, or to any obvious stimuli.

Initially, the removal from the job may help; later on, this separation has no value and may aggravate the condition if there is a salary loss. The patients are usually middle aged; occasionally it occurs in young workers but usually not in the elderly group. Probably because of the numerical proportion in industry, in the author's experience it is the men rather than the women who are affected.

When one considers the history of these individuals, it is found that some have an atopic background; however, most do not. In this series of 146 cases of eczematous hand dermatitis only eight had a history of atopic dermatitis. Hence, it appears that for most patients this is an acquired form of reactivity. Varying combinations may exist with eczematous dermatitis with eczematous skin test reactions and associated with mechanical irritation, or to dermatitis from light. In some patients with clinical and proved photodermatitis there may be eczematous reactions to chemical materials.

Clinical cases have shown multiple reactions to different chemical agents. Some have shown multiple eczematous contact dermatitis and insect hypersensitivity, both of the eczematous and the delayed tuberculin type of response. There have been patients with photo-allergy who have reactions to eczematogenic materials.

It is the author's impression, without statistical data, that the ichthyotic or seborrheic skins are not more prominent, nor is the blond color type more prominent in this series. When detailed analyses of the background of these are available there will be more definite information on the significance of the skin type.

The following are selected cases observed through frequent periods of hospitalization. In the hospital, the patient can be controlled better and followed more closely. Also, testing procedures can be observed more critically.

F. F. age 63. Exfoliative dermatitis, severe

Porphyrins — negative

Positive patch test reactions — goldenrod ++ , repeated ++

"Routine" patch test set — all negative

(Nickel, turpentine, paraphenylenediamine, formaldehyde, pyrethrin)

Light sensitivity studies +++ , repeated often +++

L. G. age 55. Recurrent eczematous contact dermatitis
Routine patch test — O
Positive patch test reactions:
Methylcellulose ++
Nitrogen mustard +++
Japanese lacquer ++
Mosquito extract (patch test) ++

W. B. age 34. Recurrent eczematous dermatitis, "nummular" type
Turpentine ++ , repeated 3 months ++
Nickel sulfate — O
Cobalt nitrate +++ ; repeated 3 months —O
Formaldehyde ++ , repeated 3 months +
Mercury bichloride + , repeated 3 months — O

One can conclude only that such varied reactions indicate a hyperactive skin.

A factor that is highly interesting and one that urgently needs more attention, is the study of the personality background of this multiple reactor. In industry, there are groups known as "accident prone." This multiple reactor individual is one who may be called "dermatitis prone." Whether he is also a "disease prone" individual with evidence of repeated infections or hypoglobulinemia, has not been determined from available data. In brief, the patient is usually a discouraged individual, a "sad-sack" type, with his continued disability from recurrent dermatitis, steady decrease in his income, and mounting difficulties with family and social life.

The psychosomatic features, then, of this multiple reactor are also important. It is not strange that, when a workman has lost so much time from his job and has so many economic problems, there should be both family and job conflicts. What the relationship of these disturbances is to the causal background of the continued dermatitis is not known. The author has insisted on a psychiatric examination for each multiple reactor admitted to the hospital for study. In the past this psychiatric evaluation consisted only of one or more interviews with the consulting psychiatrist. In the absence of a social history of the family of the workman or of his employment by a trained social worker, the psychiatric evaluation is not considered complete.

All this points up to the fact that, actually, we know little about the make-up or mechanism of the multiple reactor. Based on the work of Wedroff and Dogroff, Bloch, Sulzberger, and Rostenberg, it is concluded that the eczematous sensitive individual may react easier to other eczematic agents. Schwarz and Birmingham do not believe this. However, only few patients with eczematous dermatitis (even for prolonged periods) develop into multiple reactors.

It is considered that for therapy the factor of environmental change is the most important phase of the program. A multiple reactor as an in-patient on a Dermatology Service has relief from suspected or actual eczematogenic contacts in his job or in his home. In the hospital he has some relief from the psychosomatic factors with his dependency upon the hospital staff. He has

opportunities for complete and thorough examinations that would not be possible for him as an out-patient or when seen casually by the industrial physician. A great factor in the in-patient care, the author believes, is the opportunity to try to break up corticosteroid dependency which many of these patients have. This is being studied at the present time in a number of ways: by the usual gradual reduction of oral dosage, by the use of parenteral depot type of single dose of selected steroids at intervals, and by the use of vigorous skin therapy to try to reduce the need for corticosteroids. It is also felt that these patients should be discharged only after the skin has improved to a significant degree and when immediate relapse may not develop. It is possible as an in-patient to have a more controlled therapy, topical and systemic. For an in-patient the physician is able to set up much more easily some type of preventive program.

Proposed In-Patient Study

From a review of the background of limited data on the multiple reactor it is apparent that most of current thinking is purely speculative. There is need for research in this field. A practical program for research suggests study of the multiple reactor, first, as an in-patient. The patch testing should include not only a detailed search for possible eczematogenic substances of the job and home, but also frequent repetition of these tests to see whether the same pattern of positive reaction holds. The patient should have tests to determine toxic vulnerability of the skin, for example, by the alkali and the acid technics. By means of instrumentation, he should have further checks on the effects of standard mechanical irritation of the skin. The author is attempting to work this out with the University Committee for Engineering in Medical Research. Preliminary studies have been done with spring-pressure traumatic pad. Light testing may be performed with the carbon arc testing technic by Jillson. With improved carbon arc apparatus, the writer and associates have worked out a series of exposure values for various skin types.

Unless all these tests are set up and accurate details from history obtained, one is unable to delineate fully the degree of reactivity of the multiple reactor. Pharmacodynamic tests with histamine, nicotinic acid and its esters, acetylcholine may also be used. If the job type requires any vigorous hand cleaning, controlled testing with various cleansers is indicated. As for the immunologic mechanism, immunoelectrophoresis and the blood chemistry of electrolytes and corticosteroids are applicable. The technic of immunoelectrophoresis has been studied in the Department and it is planned to use this complex procedure in an effort to detect differences between the multiple reactor and the nonreactor. It is realized that such precipitin complexes may not even exist in eczematous dermatitis. Yet, in addition to antihuman serums, the investigative plan involves a study of antigenic "complexes" with such agents as nickel, turpentine, chromates, etc.

The definition of the proteins of the multiple reactor by paper chromatography will provide data on the various regions of his serum proteins as

compared with those of the nonreactor.

A detailed psychiatric evaluation is most important. As indicated above, the psychiatric examination will include also a background social worker's report of family service study of the multiple reactor's home and especially of his job.

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Electrical Shock
A Much-Misunderstood Hazard

Paul A. Reyff, Bureau of Labor Standards. Safety Standards X:11-15, July-August 1961.

Recently an employee of a ship-repair company reached out of a manhole to move a 110-volt electric blower. He received a shock. Almost anyone reading this could say, "I've had a shock or two from 110 volts, and it didn't do me any harm." Very true, but in this case the man was electrocuted.

Actually, voltage by itself has little effect on whether a shock is only startling or fatal. Many people receive shocks from spark-plug wires where the voltage is 10,000 or more, with no more harm than a few bruised knuckles.

The Department of Labor has recently acted to clear up some dangerous notions about electrical shock and to provide safety measures for the maritime industry. The Department's "Safety and Health Regulations for Ship Repairing" state in section 8.72(a): "The frames of portable electric tools and appliances shall be grounded either through a third wire in the cable containing the circuit conductors or through a separate wire which is grounded at the source of the current." In short, the ground connection must be made either at the receptacle ashore or on the ship.

Under section 8.72(b) of these regulations, it is further required that "Grounding circuits, other than by means of the structure of the vessel on which the tool is being used, shall be checked to insure that the circuit between the ground and the grounded power conductor has resistance which is low enough to permit sufficient current to flow to cause the fuse or circuit breaker to interrupt the current."

These regulations take into account three factors which determine the extent of harm from an electric shock: (1) The amount of current that flows through the body; that is, the amperage. (2) The path of the current through the body. (3) The length of time that the current flows.

Amperage

The amount of current necessary to kill a man is small. It is a tiny fraction of 1 ampere, even as little as 50 milliamperes (1 milliampere = 1/1000 ampere). For comparison, a 20-watt bulb draws 200 milliamperes and a one-quarter horsepower electric drill draws about 4 amperes. Table 1 presents key information about shock current intensities and their effects.

The amount of current that will flow through a person's body depends on two things: The amount of voltage, or pressure, tending to push the electricity along, and the amount of resistance, or friction, that the electricity has to overcome in moving. The pressure is measured in volts and the resistance is measured in ohms.

The human body is made up mostly of water, somewhat similar to sea water, and therefore the resistance which electricity encounters once it gets through the skin is not very great (about 500 ohms). If, then, we get 100 volts to enter and leave the body through cuts in the skin, the amount of current flowing would be

$$\frac{100 \text{ volts}}{500 \text{ ohms}} = 1/5 \text{ ampere or } 200 \text{ milliamperes} - \text{enough to be fatal.}$$

Fortunately, however, unbroken dry skin has a great deal of resistance, often as high as 100,000 ohms. In this case the current would be

$$\frac{100 \text{ volts}}{100,000 \text{ ohms}} = \frac{1}{1,000} \text{ ampere or 1 milliampere} -$$ which would result in a barely noticeable shock. Of course, if the voltage were 10,000 volts instead of 100, the amperage would be a hundred times as great, and the resulting 100 milliampere current could easily be fatal. (Another point is that a slight shock will startle a person, and may cause him to lose his balance and fall. Involuntary muscular contraction could cause a man to push himself off a ladder or scaffold. If the fall killed him, it would demonstrate that a non-fatal shock can indirectly result in a fatality.)

Table I

Current in milliamperes	Effect
Less than 1/2 milliampere	No sensation
1/2 to 2 milliamperes	Threshold of perception
2 to 10 milliamperes	Muscular contraction (mild to strong)
5 to 25 milliamperes	Painful shock, inability to let go
Over 25 milliamperes	Violent muscular contraction
50 to 200 milliamperes	Ventricular fibrillation
Over 100 milliamperes	Paralysis of breathing

Skin is not always dry, however; perspiration decreases the resistance and may lower it to as little as 1,000 ohms. In this case the current would be

$$\frac{100 \text{ volts}}{1,000 \text{ ohms}} = 1/10 \text{ ampere or } 100 \text{ milliamperes, again sufficient to}$$ cause death. In fact, it is possible with such a low resistance to obtain a fatal shock from as little as 50 volts since

$$\frac{50 \text{ volts}}{1,000 \text{ ohms}} = 1/20 \text{ ampere or } 50 \text{ milliamperes.}$$

If the amount of current is high—1 ampere or more—the effect is to immobilize the heart and the breathing muscles. If the person can be removed

from the circuit in time, and breathing restored by artificial respiration, the heart is not likely to be damaged.

Heavy currents produce deep-seated burns, since the heat is being generated by the resistance of the flesh to the passage of the current, rather than merely by an arc at the surface of the skin.

Path of Current

Current which passes from one arm to the opposite leg or from one arm to the other can endanger breathing or heart action especially when the current is over 50 milliamperes.

Current passing from one finger to another on the same hand, even when it is very high amperage—1 ampere or more—is not going to do any damage other than to the fingers. This is why some electricians survive the practice of testing circuits with their wet fingers. As long as the current is confined to the two fingers of the same hand there is no chance of electrocution. The danger lies in the possibility that another part of the body may become involved in the circuit, such as the opposite arm or leg. Then the current could affect the vital portions of the body.

The Current Flow

The severity of internal burns and heart damage also depends on the length of time that the body is in the circuit. One or two seconds of exposure can harm the heart. The longer the current flows, the more current passes, so that if the circuit cannot be broken quickly enough, the effects may increase to a dangerous level.

If we now look again at the accident related at the beginning of this article, we can see the reason for the electrocution. The path of the current was from both hands to the abdomen—right through the chest area. The resistance was low due to moisture and pressure against a metal area. The worker was unable to let go when he first felt the shock, and did not get detached from the circuit until his partner noticed that something was wrong and pulled him loose. All the factors necessary for a fatal shock from a low-voltage circuit were present.

The Importance of a Ground

If the man who picked up the "hot" blower had been leaning against dry wood instead of metal, he would have received little or no shock, because, while the current could pass easily through his skin and body, it could not pass through the dry wood to complete the circuit. In other words, insulation between the man and any conducting surface on which he is standing is just as effective as insulation over a conductor which he touches. The bird sits unharmed on the high tension transmission wire because he is not "grounded." The crane operator whose boom hits a high voltage wire receives no shock as

long as he stays entirely on the crane, because he is not grounded, while his swamper, standing on the ground, is killed when he touches the crane, the wire-fall, or a metallic load hanging from it.

Tool Hazards

Electrical equipment is designed and built to prevent the escape of electricity from the parts in which it is needed into parts where it would be both wasted and dangerous, such as the frame. Equipment approved by the Underwriters Laboratories must meet rigid tests and specifications to assure that there is no voltage on the external parts and hence no danger in handling them.

But insulation deteriorates; moisture may get inside. Particularly with an electric drill, metallic chips and dirt may penetrate and form an electrical path between the energized part and the frame. In any one of these ways, a piece of equipment which was originally safe may become hazardous, usually without any visible evidence of the fact.

A defective electrical tool may go undetected because all of the conditions necessary for a severe shock may not be present. Sometimes a tool is "hot" only when the outlet plug is inserted in a certain way in the receptacle. The reason for this is that almost every 110-volt AC circuit has one side grounded—the white wire. If the defect is in the white wire, no shock will be felt because it will be at the same voltage as ground. Merely turning the plug over in the receptacle will change the wires in the tool from hot to white (ground), so that one way the tool may be hot and the other way it will give no shock. If there are defects in both sides of the circuit, the fuse will blow and cut off all the current.

Grounding Provides the Answer

The chance of any shock from electric tools can be eliminated easily and inexpensively by grounding the frame of the tool by means of a third wire. The purpose of this third wire is to carry the current to ground as soon as a defect occurs in the tool. It protects a person from dangerous shock by causing the fuse to blow, or in the case of a high resistance current leak, by reducing the voltage on the frame of the tool to a harmless value.

Most portable electric tools are now sold with a green wire in the electric cord and a special 3-prong plug. For a number of years, portable tools had the third wire ending in a pigtail on the end of a 2-prong plug. Often these pigtails are cut off (instead of being attached to ground); the 3-prong plugs are replaced with 2-prong plugs; or 2-prong plug adapters are used without making any provision for grounding.

Even when the ground wire is attached throught the pigtail to a ground, or when 3-hole receptacles are provided for the 3-prong plugs, tests are seldom made to see that a good ground is obtained. The mere fact that a ground wire is attached to a metal structure or to what should be a grounded part of an electrical installation does not necessarily mean that a good ground

has been achieved. The resistance must be low enough to let enough current pass to blow the fuse or trip the circuit breaker. Otherwise there is no protection.

If the ground circuit resistance is high, some current will flow from the "hot" tool frame to the ground but the tool will still be "hot." If a man handles it while he is making a good ground himself, he will receive just about as much current as he would if the ground wire were not there at all.

The less the resistance in the path to ground, the more current it can carry and the more effective the ground. The resistance between the white wire and the prepared ground connection at the receptacle should be not over 3 ohms to assure that a 30-amp. fuse or circuit breaker will interrupt the current. This value can easily be checked with an ohmmeter. (Caution: Do not connect an ohmmeter between the "hot" wire and the ground as this will destroy the instrument — use the voltmeter to determine the "white" wire.)

Ship-Repair Regulations

The purpose of the Department of Labor's regulations regarding electrical tools is to make sure that all such equipment is properly grounded. In a shipyard or on a pier, the grounding circuits at all receptacles should be tested once or twice a year to insure that the ground system maintains its low resistance. Corrosion of ferrous conduits and coverings, accidental breaks, or failure to restore continuity after modifications of the electrical system, are the chief causes of failure in what was originally a proper ground system.

Section 8.72(b) does not, however, apply to cases where the vessel is the ground. If the tool is grounded to a clean metal portion of the vessel, in case of a defect in the tool, the ground wire will cause the vessel to be at the same voltage as the frame of the tool. Since the man using the tool aboard ship will not be able to be grounded himself to anything but the vessel, he cannot get a shock, since the frame of the tool and the vessel's structure will both be at the same voltage. It does not matter in this case whether the resistance through the ship is low enough to trip the circuit breakers.

This means of protecting the man by grounding the tool to the vessel would be equally effective when the source of the current was ashore. However, if the tool were defective and the voltage of the frame were applied to the vessel's structure, a man on the pier might make a good ground and could receive a shock by touching a gangway stanchion or a wire-fall from the ship's gear. Thus, while we protected the user of the tool, we might introduce a hazard to the men working around the ship. For this reason the ship should be securely grounded to the shore ground system, or used as a ground only when the source of the current is aboard ship.

One further check should be made periodically; that is, of the wires running into the tool itself. There should be very high resistance between the power conductors and the tool frame and very low resistance between the ground wire and the frame. The resistance can be checked in the shop or tool

crib with a meter. Relatively inexpensive testing panels can be purchased which permit the tests to be made quickly and easily.

Low-voltage circuits can kill, but fortunately seldom do. Proper grounding of all portable electrical tools and equipment can eliminate all risk at little expense.

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Agencies "Billed" for Costs

Safety Standards, U. S. Department of Labor, Vol. X, No. 6, page 16, November-December 1961.

Under a new system, authorized by Public Law 86-767, passed by the Congress about a year ago and known as the "charge-back," the Bureau of Employees Compensation, U. S. Department of Labor, started about 2 months ago to "bill" each agency for the costs of its employee injuries which occurred on or after December 1, 1960. Although the first "bills" sent to the heads of agencies amounted to $2.9 million, it is just the beginning. They will be sent each August and are computed on a fiscal year basis. Thus, the first statements of costs to agencies represent only slightly more than one-half of the 1961 fiscal year.

The "bills," to follow in the years ahead, will be larger than the first sent out because they will reflect, not only the costs of injuries for an entire year, but the cumulative expenses of carry-over cases. "We have had some compensation cases for as long as 40 years," says Mr. Brayer, and he adds: "I hope the agency administrators who received 'surprisingly low' statements aren't lulled into complacency."

Evidence of official reaction which may augur well for safety efforts, came from the first charge-back statements. The head of one agency wrote: "I am deeply concerned about the unfavorable employee injury experience we are having.... You have my assurance that our efforts will be directed toward a positive action to reverse the trend."

Mr. Brayer recalls that in 1939 the frequency rate of disabling injuries to Federal employees was 13.1. During the turbulence of World War II the rate was actually reduced to 11.0. Progress in succeeding years came much slower and the rate has fluctuated between 7.7 and 8.5 over the past half dozen years.

"If we exclude one large department which has had a persistent adverse trend," he says, "we find that during the past decade the rate has decreased nearly 30%, from 7.7 to 5.7." This one agency, incidentally, received a "bill" for $1.4 million—almost half of the total amount the agencies were called upon, in the first charge-back statements, to pay to Employees Compensation Fund.

Through improved medical care programs and the elimination of the more serious hazards, spectacular reductions have been recorded in the severity rate. Since 1939, when the rate was 1,230 days lost per million

man-hours worked, there has been a 53% reduction to a figure of 594 for 1960. If these improvements had not been made in safety performance, "work injuries today would be costing $34 million more than we are now expending," Mr. Brayer observes.

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RESERVE SECTION

USNR Retirement Worries? Check Over These Points (concluded)

Retirement of Warrant Officers After 20 Years' Active Duty

Under the provisions of Title 10, U.S. Code, section 1293, Reserve warrant officers who have performed at least 20 years/ active duty (including active duty for training) may be placed on the Retired List upon their request.

Retirement pay is computed as outlined above* for retirement after 20 years' active duty. Such retirement pay may not exceed 75% of basic pay.

Any warrant officer in the Naval Reserve on active or inactive duty who meets the requirements is eligible.

Applications should be submitted 6 months before the desired date of retirement. Additional information on nondisability retirement may be found in BUPERS Instruction 1820.1B; future changes to the BUPERS Manual will include this data. (The Naval Reservist, NAVPERS 15653, November 1961)

* Ref: USN Med News Ltr of 15 Dec. 1961

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Fiscal Year 1962 Selection Boards

On 3 January 1962 a selection board convened to select eligible Naval Reserve officers of the Medical Corps on inactive duty in the grade of Captain for promotion to the grade of Rear Admiral. To be eligible for consideration for selection, officers must meet the following requirements:

1. Be in an active status, i.e., USNR-R or USNR-S1.
2. Prior to the beginning of the fiscal year in which the individual concerned will be in the established promotion zone or otherwise eligible for consideration for promotion, he shall earn an average of 12 promotion points for each year in grade computed from 1 July following date of rank, or from date of rank if it be 1 July, to 30 June of the fiscal year preceding the fiscal

year in which he is in the established promotion zone. In no case shall more than 72 points be required. (Officers released from active duty on or after 1 July 1958 are not subject to these point requirements.)

3. Be in the zone of eligibility. The Register Number of the junior Captains eligible for consideration is 000183.

4. In addition, officers in the promotion zone are encouraged to have a complete physical examination prior to the convening of the selection board. Further details in this regard are included in BuPers Instruction 1410.2 dated 11 July 1961, a copy of which has been provided to all Naval Reserve officers on inactive duty in the grades of Rear Admiral and Captain.

On 27 February 1962 a selection board will be convened to select Naval Reserve Medical Corps, Medical Service Corps, and Nurse Corps Lieutenant Commanders and Commanders on inactive duty for promotion to the grades of Commander and Captain, respectively.

To be eligible for consideration for selection an officer must meet requirements 1 and 2 shown in the discussion of selection for flag grade, and be in the established promotion zone as follows:

Register numbers of junior Lieutenant Commanders eligible for selection to Commander

Medical Corps	No. 001071
Medical Corps (W)	No. 000002
Medical Service Corps	No. 000218
Nurse Corps	No. 000434 (tentative)

Register numbers of junior Commanders eligible for selection to Captain

Medical Corps	No. 000438
Medical Service Corps	No. 000044
Nurse Corps	No. 000005 (tentative)

On 24 April 1962 a selection board will select eligible Naval Reserve Medical Corps, Medical Service Corps, and Nurse Corps Lieutenants on inactive duty for promotion to the grade of Lieutenant Commander and, Medical Service Corps and Nurse Corps Lieutenants Junior Grade on inactive duty for promotion to the grade of Lieutenant. To be eligible for selection an officer must meet requirements 1 and 2 shown in the discussion of selection for flag grade and be in the established promotion zone as follows:

Register numbers of junior Lieutenants eligible for selection for promotion to Lieutenant Commander

Medical Corps	No. 004502
Medical Corps (W)	No. 000002
Medical Service Corps	No. 000207
Nurse Corps	See note following

Promotion to Lieutenant - Lieutenants (Junior grade) of the Medical service Corps with dates of rank in calendar year 1959 or earlier are in the promotion zone.

For Nurse Corps officers, see note below.

NOTE: Officers of the Nurse Corps Reserve are eligible for consideration for promotion when they are senior to the junior officer of the same grade of the Nurse Corps on active duty on the lineal list of the Nurse Corps who has been selected for promotion . Accordingly, promotion zones for Reserve officers of the Nurse Corps will be established upon final approval of the fiscal year 1962 lineal list selection boards for Nurse Corps officers.

An officer may determine his register number by reference to the Register of Commissioned and Warrant Officers of the United States Naval Reserve, 1 July 1959, NAVPERS 15.009. A copy of this publication is available at most naval activities.

Selection boards to recommend Reserve officers for promotion are convened by the Secretary of the Navy. Such boards serve until the proceedings of the board have been approved by the President. Selection boards are composed of at least 5 officers of the line or appropriate staff corps who are senior in permanent grade and temporary rank to any officer being considered by that board. At least a majority of the members of each board are Naval Reserve officers. No officer may serve on two consecutive selection boards when the second board considers any of the officers who were considered but not recommended for promotion by the first board upon which he served.

(concluded in next issue)

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